

Remarks

The instant Office Action dated March 20, 2008 notes the following rejections: claims 1, 3, 5, 7-8 and 10 stand rejected under 35 U.S.C. § 103(a) over Chudzik (U.S. Patent No. 7,030,481) in view of Larson *et al.* (U.S. Patent No. 5,495,117); claims 2, 4 and 6 stand rejected under 35 U.S.C. § 103(a) over Chudzik and Larson and further in view of Kosaki *et al.* (U.S. Patent No. 6,268,619); and claim 9 stands rejected under 35 U.S.C. § 103(a) over Chudzik and Larson and further in view of Goldberger *et al.* (U.S. Patent No. 6,538,300). In this discussion set forth below, Applicant does not acquiesce to any rejection or averment in the instant Office Action unless Applicant expressly indicates otherwise.

Applicant respectfully traverses the § 103(a) rejection of claims 1, 3, 5, 7-8 and 10 because the cited portions of the Chudzik and Larson references do not correspond to the claimed invention which includes, for example, aspects directed to the dielectric material of a vertical trench capacitor and the dielectric material of a vertical interconnect being common material as would be formed from the same material lot or deposition layer. The Office Action appears to be confusing Chudzik's teachings relating to separate dielectric layers that can be the same type of material with the claimed invention, which has a single deposition layer that forms both the dielectric of a vertical trench capacitor and insulation between a substrate and a vertical interconnect. *See, e.g.*, page 7:19 to page 8:3 of the instant Office Action. More specifically, the cited portions of the Chudzik reference do not teach that insulating material 220, which separates the conductive material 230 in via 210 from the substrate 200, is the same (*i.e.*, part of the same deposition layer) as the dielectric film 3020 of the trench capacitor structures 3010. *See, e.g.*, Figure 3b and Col. 4:13-15. Chudzik simply teaches that these two separate layers (220 and 3020) could be formed of the same type of dielectric material. To facilitate prosecution and to indicate that which should be already apparent, Applicant has amended the claim to impart distinctive structural characteristic (*i.e.*, common material is formed from the same deposition). Consistent with M.P.E.P § 2113, such aspects should be considered when assessing patentability. Accordingly, the cited portions of Chudzik do not teach that the dielectric of a vertical trench capacitor and the dielectric that insulates a vertical interconnect are formed from the same material as in the claimed invention

Applicant further submits that the cited portions of the Larson reference are essentially unrelated to the claimed invention because Larson does not teach that insulating layers (20, 26, and 36) provide insulation between a substrate and a vertical interconnect that extends through the substrate or that these insulating layers form the dielectric of a vertical trench capacitor. The Office Action's erroneous assertion that Larson teaches that insulating layers (20, 26, and 36) are used as insulation between a substrate and a vertical interconnect is directly contradicted by the cited portions of Larson which teach that these insulating layers (20, 26, and 36) are deposited over a transistor 10 that is fabricated on a substrate. *See, e.g.*, Figure 4F and Col. 3:46-57. Larson does not mention any vertical interconnect that extends through this substrate or that Larson's insulating layers (20, 26, and 36) are used as insulation between this substrate and some apparently nonexistent vertical interconnect. The cited portions of Larson also do not mention that these insulating layers (20, 26, and 36) are used as the dielectric in a vertical trench capacitor. Accordingly, the cited portions of Larson do not teach that insulating layers (20, 26, and 36) form the dielectric of a vertical trench capacitor or that these insulating layers provide insulation between a substrate and a vertical interconnect that extends through the substrate. Should any rejection based on the Larson reference be maintained, Applicant requests clarification regarding the Examiner's continued reliance on Larson. As discussed above, the cited portions of Larson are in essence unrelated to the claimed invention; as such, it is unclear to Applicant how these portions of Larson are relevant to the claimed invention. *See, e.g.*, 37 CFR 1.104 ("The pertinence of each reference, if not apparent, must be clearly explained and each rejected claim specified.") and M.P.E.P. § 706.02(j), ("It is important for an examiner to properly communicate the basis for a rejection so that the issues can be identified early and the applicant can be given fair opportunity to reply.")

In view of the above, the Office Action fails to cite to any reference that teaches or suggests that the dielectric material of both a vertical trench capacitor and a vertical interconnect are formed from common material of a single deposition layer as in the claimed invention. As such, Applicant submits that the cited combination of the Chudzik and Larson references does not correspond to the claimed invention. Accordingly, the § 103(a) rejection of claims 1, 3, 5, 7-8 and 10 is improper and Applicant requests that it be withdrawn.

Applicant further traverses the § 103(a) rejection of claim 3 because the cited portions of the Chudzik reference do not teach that the vertical interconnect includes a plurality of parallel trenches that are each substantially filled with conductive material. The Office Action asserts that Chudzik's via 210 corresponds to the claimed vertical interconnect (*see, e.g.*, page 3 of the instant Office Action); however, Chudzik does not teach that via 210 includes a plurality of parallel trenches (*see, e.g.*, Figures 3b and 4a). The Office Action then improperly attempts to show correspondence to the plurality of parallel trenches by citing to another via 410' that is filled with conductive filler 430'. *See, e.g.*, Figure 4a and Col. 6:13-25. Applicant submits that the cited portions of Chudzik teach a plurality of vias (*i.e.*, a plurality of vertical interconnects), instead of a vertical interconnect that includes a plurality of parallel trenches that are each substantially filled with conductive material as in the claimed invention. Accordingly, the § 103(a) rejection of claim 3 is improper and Applicant requests that it be withdrawn.

Applicant respectfully traverses the § 103(a) rejections of claims 2, 4, 6 and 9 (each of which is based on the Chudzik and Larson references) because the cited combination of these references does not correspond to the claimed invention as discussed above in relation to the § 103(a) rejection of claim 1. In at least this regard, the § 103(a) rejections of claims 2, 4, 6 and 9 are improper because these claims depend from claim 1. That is, if an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. *See, In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). Accordingly, the § 103(a) rejections of claims 2, 4, 6 and 9 are improper and Applicant requests that they be withdrawn.

Applicant further traverses the § 103(a) rejection of claim 9 because the cited portions of the Goldberger reference do not teach that a planar capacitor is present on the first side of the substrate. Specifically, the cited portions of Goldberger teach that the second plate of the capacitor is the substrate 102. *See, e.g.*, Figure 1 and Col. 3:19-24. Thus, Goldberger teaches that the substrate 102 forms part of the capacitor, instead of a planar capacitor that is on the first side of the substrate as claimed. Moreover, the Office Action erroneously asserts that Goldberger teaches that the dielectric material (*i.e.*, 104) of this capacitor is part of the same layer of dielectric material as the dielectric material of some unidentified vertical trench capacitor. The cited portions of Goldberger do not

mention any vertical trench capacitor, let alone that the dielectric material of this apparently nonexistent trench capacitor is part of the same deposited layer of dielectric material as the dielectric material used in a planar capacitor. Applicant submits that the cited portions of Goldberger are essentially unrelated to the claimed invention. As such, should any rejection based on the Goldberger reference be maintained, Applicant requests clarification regarding how the cited portions of Goldberger are relevant to the claimed invention. Accordingly, the § 103(a) rejection of claim 9 is improper and Applicant requests that it be withdrawn.

Applicant has added new claims 20-27. Applicant submits that claims 20-27 are allowable over the cited references for at least the reasons discussed above. As a first example, claims 20-22 depend from claim 1. As a second example, claims 23-27 contain aspects relating a single deposition layer of dielectric material; Applicant submits that such aspects are not disclosed by any of the cited references.

In view of the remarks above, Applicant believes that each of the rejections has been overcome and the application is in condition for allowance. Should there be any remaining issues that could be readily addressed over the telephone, the Examiner is asked to contact the agent overseeing the application file, Peter Zawilski, of NXP Corporation at (408) 474-9063.

Please direct all correspondence to:

Corporate Patent Counsel
NXP Intellectual Property & Standards
1109 McKay Drive; Mail Stop SJ41
San Jose, CA 95131

CUSTOMER NO. 65913

By: 

Name: Robert J. Crawford
Reg. No.: 32,122
651-686-6633
(NXPS.351PA)